

WHAT IS CLAIMED IS:

1. A process for preparing a polymer comprising preparing a polymer using a process having at least one process stream, the at least one process stream having at least one characteristic of interest, and the process further comprising passing the at least one process stream past a sensor probe connected to a near-IR spectrophotometer and passing light from a light source through the probe and into the spectrometer wherein the light source, spectrometer and sensor probe are connected by a fiber optic cable; and wherein the effect of the interaction of the process stream and the light passing through the sensor probe is measured and used to define a value for the at least one characteristic of interest; and wherein the value for the at least one characteristic of interest is a component of an algorithm used in real time to monitor, control, or monitor and control the process for preparing a polymer.
2. The process of Claim 1 wherein the polymer is polystyrene or polyethylene.
3. The process of Claim 1 wherein the near-IR spectrophotometer scans a wavelength range of from about 750 to about 2500 microns nanometers.
4. The process of Claim 4 wherein the near-IR spectrophotometer scans a wavelength range of from about 1100 to about 1800 nanometers.
5. The process of Claim 1 wherein the near-IR spectrophotometer and the light source are separate.

6. The process of Claim 1 wherein the near-IR spectrophotometer and the light source are an integrated unit.
7. The process of Claim 1 wherein the probe is selected from the group
5 consisting of transmittance probes, reflectance probes, and attenuated reflectance probes
8. The process of Claim 1 wherein the probe is in close proximity to the near-IR spectrophotometer.
- 10 9. The process of Claim 1 wherein the probe is remote from the near-IR spectrophotometer.
- 15 10. The process of Claim 1 additionally comprising interfacing the near-IR spectrophotometer to a process controller.
11. The process of Claim 10 wherein the process controller is a PID controller.
- 20 12. The process of Claim 10 wherein the process controller is an artificial intelligence based controller.
13. The process of Claim 12 wherein the artificial intelligence based controller is a neural net artificial intelligence controller.
- 25 14. The process of Claim 1 wherein there are two probes connected to the near-IR spectrophotometer.

15. The process of Claim 14 wherein both probes are in the same process stream.
16. The process of Claim 14 wherein the probes are in separate process streams.
17. The process of Claim 14 wherein the near-IR spectrophotometer is automated
18. The process of Claim 1 wherein the near-IR spectrophotometer incorporates a computer to perform some or all of the processes of interpreting spectra and making calculations therewith.
19. A process for preparing a polystyrene comprising preparing polystyrene using a process having at least one process stream, the at least one process stream having at least one characteristic of interest, and the process further comprising passing the at least one process stream past a sensor probe connected to a near-IR spectrophotometer and passing light from a light source through the probe and into the spectrometer wherein the light source, spectrometer and sensor probe are connected by a fiber optic cable; and wherein the effect of the interaction of the process stream and the light passing through the sensor probe is measured and used to define a value for the at least one characteristic of interest; and wherein the value for the at least one characteristic of interest is a component of an algorithm used in real time to monitor, control, or monitor and control the process for preparing polystyrene.

20. The process of Claim 19 wherein the characteristic of interest is selected from the group consisting of: styrene content, rubber particle size, polystyrene content, mineral oil, diluent, and rubber content.

5 21. A process for preparing a polyethylene comprising preparing polyethylene using a process having at least one process stream, the at least one process stream having at least one characteristic of interest, and the process further comprising passing the at least one process stream past a sensor probe connected to a near-IR spectrophotometer and passing light
10 from a light source through the probe and into the spectrometer wherein the light source, spectrometer and sensor probe are connected by a fiber optic cable; and wherein the effect of the interaction of the process stream and the light passing through the sensor probe is measured and used to define a value for the at least one characteristic of interest; and wherein the value for the at
15 least one characteristic of interest is a component of an algorithm used in real time to monitor, control, or monitor and control the process for preparing polyethylene.

22. The process of Claim 21 wherein the characteristic of interest is
20 selected from the group consisting of: polyethylene solids content, polyethylene density, and polyethylene particle size.